MATHEMATICS (US)		**0444/31**
Paper 3 (Core)		**May/June 2016**
MARK SCHEME		
Maximum Mark: 104		

Published

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This document consists of **5** printed pages.

Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question			Answer	Mark	Part marks
1	**(a)**	**(i)**	3	**1**	
		(ii)	36 or 72	**1**	Accept both for 1 mark
		(iii)	49	**1**	
		(iv)	27	**1**	
		(v)	6	**1**	
	(b)	**(i)**	43	**1**	
		(ii)	50	**1**	
	(c)		$\frac{2}{3}$ 3	**1**	
	(d)	**(i)**	$3^2 \times 5$ or $3 \times 3 \times 5$	**2**	**B1** for 3 and 5 only identified as factors or for a correct product e.g. 9×5 or 3×15
		(ii)	15	**2**	**M1** for $3 \times 5 \times 7$ [= 105] or **B1** for 3 or 5 as final answer
2	**(a)**	**(i)**	$\frac{2}{5}$ oe	**1**	Allow 0.4, 40%
		(ii)	$\frac{3}{5}$ oe	**1**	Allow 0.6 , 60%
		(iii)	0	**1**	
	(b)	**(i)**	4	**1**	
		(ii)	4.3	**2**	**M1** for their total $86 \div 20$

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Question	Answer	Mark	Part marks
(iii) (a)	$\dfrac{3}{20} \times 360$	1	
(b)	90	2	**M1** for $\dfrac{5}{20}$ oe or $\dfrac{360}{20}$ oe implied by 18 seen
(c) (i)	14	2	**M1** for $\dfrac{168}{360}$ oe or $\dfrac{360}{30}$ oe implied by 12 seen
(ii)	43.3	3	**B1** for [total angle=] 156° **M1** for $\dfrac{their\ angle}{360} [\times 100]$ oe If B0M0 **SC1** for 53.3
(iii)	5	2	**M1** for $\dfrac{10}{100} \times 360$ oe or 36
3 (a)	7034.16	3	**M2** for $14 \times 237 \times 2 \times 1.06$ oe or **M1** for $14 \times 237 \times 2$ oe or 237×1.06 oe or $237 \times 2 \times 1.06$ oe or $237 \times 1.06 \times 14$ oe
(b)	4.22	2	**M1** for $20 - 2 \times 7.89$
(c)	16 08 or 4 08 pm	2	**B1** for 45 min soi
(d)	03 00 or 3 am	3	**M1** for $270 \div 32.4$ or 8.33[…] or 8 (h) 20 (min) **M1dep** for 18 40 + *their* 8.33
(e)	1000	2	**M1** for $\frac{1800}{4+5}$ [×5] oe
4 (a) (i)	8	1	
(ii)	–2	3	**M1** for first step correctly completed **M1FT** for second step correctly completed
(b) (i)	$19x + 117$	2	**B1** for $19x + c$ or $mx + 117$
(ii)	$15x + 625 = their$ (b)(i) 127	1 2	**M1FT** for the first correct step of *their* linear equation
5 (a) (i)	Wednesday	1	
(ii)	5	1	accept –5
(iii)	–3 –2 –1 0 1 2 5	1	

Question	Answer	Mark	Part marks
(iv)	–6	1	
(b) (i)	2 million or 2 000 000	1	
(ii)	3	2	**B1FT** for an answer of 3.039 or 3.04 or 3.0 or 6078000 ÷ *their* (b)(i)
(c)	28.3 or 28.27 to 28.28	4	**B1** for radius of 5 cm or 4 cm soi **M2** for $\pi \times 5^2 - \pi \times 4^2$ soi or **M1** for $\pi \times 5^2$ or $\pi \times 4^2$ soi If 0 scored **SC2** for $\pi \times 10^2 - \pi \times 8^2$ or **SC1** for $\pi \times k^2$
6 (a) (i)	[0]67	1	
(ii)	135	2	**B1** for 9 (cm)
(iii)	Correct diagram	2	**B1** for correct bearing **B1** for correct length
(b) (i)	29	1	
(ii)	252	2FT	**M1FT** for 180 + 43 + *their* (b)(i)
(c)	445	2	**M1** for $267^2 + 356^2$ or better
7 (a) (i)	73.38	3	**B1** for 5.4 or 4.7 soi **M1** for a completely correct method
(ii)	160 000	2FT	**B1FT** for *their* (a)(i) × 2175 or 159601.5[0]
(b)	45.8 or 45.80 to 45.81	2	**M1** for tan [=] 1.8 ÷ 1.75
(c)	53 060.4[0]	3	**M2** for $50\,000 \times 1.02^3$ oe or **M1** for two years compound interest eg $50\,000 \times 1.02^2$ oe implied by 52 020
(d)	10	3	**M2** for $(\frac{198000}{180000} \times 100) - 100$ oe or $(\frac{198000 - 180000}{180000}) \times 100$ or **M1** for $\frac{198000}{180000}[\times 100]$ oe or figs 11 or **B1** for 198 000 – 180 000 or 18 000 seen

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Question	Answer	Mark	Part marks
8 (a)	… 14 … 20 20 … 14 … 0	3	**B2** for 3 or 4 correct **B1** for 2 correct
(b)	Completely correct curve	4	**B3FT** for 8 or 9 points correctly plotted or **B2FT** for 6 or 7 points correctly plotted or **B1FT** for 4 or 5 points correctly plotted
(c)	$(3.5, h)$	1	$20 < h \leqslant 20.4$
(d) (i)	Correct **ruled** line	1	
(ii)	1.4 5.6	1, 1FT	**FT** *their* graph and line
9 (a)	Correct image, points at $(0,-3)$, $(0,-1)$, $(2,-3)$ and $(4,-1)$	2	**B1** for one correct movement either horizontal or vertical
(b) (i)	Correct image, points at $(0, 6)$, $(8, 6)$, $(4, 2)$ and $(0, 2)$	2	**B1** for correct scale factor and orientation but incorrect centre
(ii)	$\dfrac{1}{2}$	1	
(c)	Reflection [in mirror line] $x = -1$ oe	1 1	
(d)	Rotation [centre] $(0, 0)$ oe [angle] $180°$ oe	1 1 1	**SC1,1,1** for Enlargement , SF = –1, centre $(0, 0)$

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